



WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2005MN98B

Title: Wireless Technologies Applied to Environmental Variables and Nutrient Loadings

Project Type: Research

Focus Categories: Nitrate Contamination, Climatological Processes, Water Quality

Keywords: Sensors, Network

Start Date: 03/01/2005

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Federal Funds: \$25,000

Non-Federal Matching Funds: \$43,754

Congressional District: MN 05

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Abstract

Both spatial and temporal heterogeneities in the environment influence a variety of processes of interest to environmental engineers, geochemists, hydrologists, and policy makers. These spatially and temporally distinct events can only be detected with a high speed real-time embedded networked sensing. The objective of proposed research is to develop a platform for small-scale sensor networks that wirelessly provide real-time data for selected environmental conditions and concentrations. Specifically, we will use recently commercially available sensor boards and processors to measure and transfer environmental parameters, including temperature, light, humidity, wind velocity, pressure, and precipitation along the Mississippi River. Additionally, we will link a commercially available nitrate biosensor to the boards and processors. Through the wireless communication, the real-time data will be transferred via the Internet. Without a thorough understanding of how external and environmental conditions/variables affect chemical and biological processes, accurate estimations of concentrations of chemicals and their effects on biota cannot be accurately predicted. Real-time sensing can provide the necessary data to improve such estimations and can be used to propose meaningful

best management practices in the environment. The experience developed and data collected from this work will be useful in developing and deploying larger networks. The purchase of the sensors, the development of a small, trial network, and the resulting expertise developed by the personnel are all long-term financial and intellectual investments in the University of Minnesota.